

(19)



(11)

**EP 1 903 055 A3**

(12)

**EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**06.08.2008** Bulletin 2008/32

(51) Int. Cl.:  
**C07K 14/285** (2006.01) **A61K 39/102** (2006.01)  
**C12N 15/73** (2006.01) **C12N 15/09** (2006.01)

(43) Date of publication A2:  
**26.03.2008** Bulletin 2008/13

(21) Application number: **07021386.3**

(22) Date of filing: **16.03.2000**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU**  
**MC NL PT SE**  
 Designated Extension States:  
**AL LT LV MK RO SI**

(30) Priority: **16.03.1999 US 268347**

(62) Document number(s) of the earlier application(s) in  
 accordance with Art. 76 EPC:  
**00910463.9 / 1 180 119**

(71) Applicant: **Sanofi Pasteur Limited**  
**Toronto ON M2R 3T4 (CA)**

(72) Inventors:  
 • **Loosmore, Sheena M.**  
**Aurora**  
**Ontario L4G 4R4 (CA)**  
 • **Yang, Yan-Ping**  
**Toronto**  
**Ontario M2N 6Y6 (CA)**  
 • **Klein, Michel H.**  
**Toronto**  
**Ontario M4N 1B9 (CA)**  
 (74) Representative: **Cole, William Gwyn et al**  
**HLBBshaw**  
**Merlin House**  
**Falconry Court**  
**Baker's Lane**  
**Epping, Essex CM16 5DQ (GB)**

(54) **Recombinant haemophilus influenzae adhesin proteins**

(57) Recombinant production of Hia protein, in full-length and N-terminally truncated forms, of non-typeable strains of *Haemophilus influenzae*, is described. The nucleic acid and deduced amino acid sequences of Hia

genes of various strains of non-typeable and type c *Haemophilus influenzae* also are described.

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## EUROPEAN SEARCH REPORT

Application Number  
EP 07 02 1386

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document, with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 96/30519 A (UNIV WASHINGTON [US]; UNIV ST LOUIS [US]; ST GENE JOSEPH W III [US]; B) 3 October 1996 (1996-10-03) * abstract * * page 82 - page 84; example 3; sequences 14, 15 * -----	1-10	INV. C07K14/285 A51K39/102  ADD. C12N15/70 C12N15/09
Y	ST GENE III J W ET AL: "Prevalence and distribution of the hmw and hia genes and the HMW and Hia adhesins among genetically diverse strains of nontypeable Haemophilus influenzae" INFECTION AND IMMUNITY, AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, US, vol. 66, no. 1, January 1998 (1998-01), pages 364-368, XP002137980 ISSN: 0019-9567 * the whole document * -----	1-10	
X	BARENKAMP S J ET AL: "IDENTIFICATION OF A SECOND FAMILY OF HIGH-MOLECULAR-WEIGHT ADHESION PROTEINS EXPRESSED BY NON-TYPABLE HAEMOPHILUS INFLUENZAE" MOLECULAR MICROBIOLOGY, BLACKWELL SCIENTIFIC, OXFORD, GB, vol. 19, no. 6, 1996, pages 1215-1223, XP000579265 ISSN: 0950-382X * the whole document * -----	1-10	TECHNICAL FIELD SEARCHED (IPC)  C07K C12N
-/-			
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		24 June 2008	Griesinger, Irina
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : perfectly relevant (taken alone) Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons S : member of the same patent family, corresponding document</p>			

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## EUROPEAN SEARCH REPORT

Application Number  
EP 07 02 1386

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	<p>GENE J W S ET AL: "CHARACTERIZATION OF THE GENETIC LOCUS ENCODING HAEMOPHILUS INFLUENZAE TYPE B SURFACE FIBRILS" JOURNAL OF BACTERIOLOGY, WASHINGTON, DC, US, vol. 178, no. 21, November 1996 (1996-11), pages 6281-6287, XP000863110  ISSN: 0021-9193  * the whole document *  * figure 6 *</p>	1-10	
Y	<p>WO 96/40929 A (CONNAUGHT LAB [CA]; LOOSMORE SHEENA M [CA]; HARKNESS ROBIN E [CA]; SCH) 19 December 1996 (1996-12-19)  * page 10, line 33 - line 34 *  * page 5, paragraph 1; example 23 *</p>	2-10	
Y	<p>YANG Y P ET AL: "A 20-kilodalton N-terminal fragment of the D15 protein contains a protective epitope(s) against Haemophilus influenzae type a and type b." INFECTION AND IMMUNITY JUL 1998, vol. 66, no. 7, July 1998 (1998-07), pages 3349-3354, XP002467368  ISSN: 0019-9567  * page 3349, right-hand column; figure 1 *  * page 3351 *</p>	2-10	TECHNICAL FIELDS SEARCHED (IPC)
E	<p>WO 00/51633 A (CONNAUGHT LAB [CA]; LOOSMORE SHEENA M [CA]; YANG YAN PING [CA]; KLEIN) 8 September 2000 (2000-09-08)  * the whole document *</p>	1-10	
<p>4 <del>The patentee does not object to the citation of the document</del></p>			
Place of search		Date of notification of the result	Searcher
Munich		24 June 2008	Griesinger, Irina
CATEGORY OF CITED DOCUMENTS			
<p>X: particularly relevant (taken alone)  Y: particularly relevant if combined with another document of the same category  A: technological background  O: non-written disclosure  P: intermediate document</p>		<p>Y: theory or principle underlying the invention  E: earlier patent document, but published on, or after the filing date  D: document cited in the application  L: document cited for other reasons  S: member of the same patent family, corresponding document</p>	



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Application Number  
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#### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

#### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:  
1-10 (all claims partially)
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- ☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

European Patent  
OfficeLACK OF UNITY OF INVENTION  
SHEET BApplication Number  
EP 07 02 1385

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

## Invention 1: 1-10 (all partially)

Haemophilus influenzae adhesin (Hia) protein from non-typeable strain 33 characterized by its corresponding nucleotide and protein sequences (SEQ ID NOs:23 and 24). Provided are in addition to the full-length version (cf. claim 1), (N-) truncated versions, partially characterized by the corresponding amplifiable primer pair (cf. claim 2). Additionally provided is related subject-matter such as vectors, host cells, immunogenic compositions and methods using said compositions or sequence information.

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## Inventions 2-8: 1-10 (all partially)

Haemophilus influenzae adhesin (Hia) protein characterized by one of the following nucleotide/protein sequence pairs: SEQ ID NOs: 25/26 (strain 32), SEQ ID NOs: 27/28 (strain 29), SEQ ID NOs: 29/30 (strain M4071), SEQ ID NOs: 31/32 (strain K9), SEQ ID NOs: 33/34 (strain K22), SEQ ID NOs: 35/36 (strain API), or SEQ ID NOs: 37/38 (strain 12). For additional subject-matter, cf. Invention 1.

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as far as possible in the European Patent Office EPO file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-06-2008

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EPC FORM P/03

For more details about this annex see Official Journal of the European Patent Office, No. 12/02